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Please amend the application filed on even date herewith prior to proceeding with its examination.

IN THE CLAIMS

Claims 1-22 (Cancelled).

23. (New) A method of compressing a substance by impact utilizing a relativistic vacuum diode having an axisymmetric vacuum chamber with current-conducting walls, an axisymmetric plasma cathode and an axisymmetric anode-enhancer, including:

producing a target in the shape of an axisymmetric part made of a condensed substance that functions as at least a part of the anode-enhancer,

producing a plasma cathode in the form of a current-conducting rod comprising a dielectric end element having the perimeter of the rear end embracing the perimeter of said rod at least in the plane perpendicular to the axis of symmetry of the cathode as the whole with a continuous gap, and the area of the emitting surface being greater than the maximum cross-section area of the anode enhancer,

placing said cathode inside the vacuum chamber of the relativistic vacuum diode in such position that the axes of symmetry of this cathode and this vacuum chamber practically coincide,

placing the anode-enhancer in the vacuum chamber of the relativistic vacuum diode practically on the same geometric axis with the plasma cathode with such a gap that the center of curvature of the working surface of the anode-enhancer is located inside the focal space of the collectively self-focusing electron beam

pulse discharge of a high-voltage power source via the relativistic vacuum diode to generate an electron beam with an electron energy not smaller than 0.2 MeV, and

acting upon the surface of the anode-enhancer by said beam in an electron collectively self-focussing mode with the current density not smaller than 10^6 A/cm^2 and pulse duration not greater than 100 ns.

24. (New) A method as defined in claim 23, wherein used in the relativistic vacuum diode plasma cathode has a pointed current-conducting rod, the dielectric end element of this cathode is provided with an opening for setting on said rod, and the setting part of said rod together with the pointed end is located inside the opening.

25. (New) A method as defined in claim 23, wherein the target is formed in the shape of an insert into the central part of the RVD anode-enhancer, the diameter of said insert is chosen in the range of 0.05 to 0.2 of the maximum cross-sectional dimension (d_{max}) of the anode-enhancer.

26. (New) A method as defined in claim 23, wherein at least that part of the anode-enhancer, which is directed to the plasma cathode, is spheroidally formed prior to mounting in the relativistic vacuum diode.

27. (New) A method as defined in claim 25, wherein the target is formed in the shape of a spheroidal body tightly fixed inside the anode-enhancer in such a way that the centers of the inner and outer spheroids practically coincide.

28. (New) A method as defined in claim 23, wherein the anode-enhancer surface is acted upon by an electron beam having the electron energy up to 1.5 MeV, current density not greater than 10^8 A/cm^2 and duration not greater than 50 ns.

29. (New) A method as defined in claim 28, wherein the current density of the electron beam is not greater than 10^7 A/cm^2.

30. (New) A method as defined in claim 23, wherein the residual pressure in the vacuum chamber of the relativistic vacuum diode is maintained at the level not greater than 0.1 Pa.

31. (New) A device for impact compression of a substance, which is based on relativistic vacuum diode and is comprised of:

a strong gas-tight housing a part of which is made of a current-conducting material shaped in axial symmetry to confine a vacuum chamber, and

an axisymmetric plasma cathode in the form of a current-conducting rod with a dielectric end element having the perimeter of the rear end embracing the perimeter of said rod at least in the plane perpendicular to the axis of symmetry of said cathode with a continuous gap,

an axisymmetric anode-enhancer at least a part of which is designed to be a target for impact compression, said anode-enhancer having the maximum cross-section area smaller than the area of the emitting surface of said cathode and being mounted in said vacuum chamber with a gap practically on the same geometric axis of with said cathode, and

a pulsed high-voltage power source connected at least to said plasma cathode,

at least one of said relativistic vacuum diode electrodes being provided with means for adjusting the gap between the electrodes, and

the distance from the common geometric axis of said electrodes to the inner side of the current-conducting wall of said vacuum chamber being greater than $50\mathbf{d}_{max}$, where $\mathbf{d}_{max}$ is a maximum cross-sectional dimension of the said anode-enhancer.

32. (New) A device as defined in claim 31, wherein the current-conducting rod of said plasma cathode is pointed and the dielectric end element thereof is provided with an

opening for setting on said rod the setting part of which is located inside said opening together with the pointed end.

33. (New) A device as defined in claim 31, wherein said anode-enhancer has a circular shape in the cross section and is completely produced of a material to be transmuted that is current-conducting in its main mass.

34. (New) A device as defined in claim 31, wherein said anode-enhancer is made composite and comprises at least a one-layer solid shell and an inserted target tightly embraced by this shell, said target being in the shape of a body of revolution and made of an arbitrary condensed material with a diameter within the range of (0.05-0.2) $\mathbf{d}_{max}$, where $\mathbf{d}_{max}$ is a maximum cross-sectional dimension of the anode-enhancer.

35. (New) A device as defined in claim 31, wherein at least one shield preferably of current-conducting material is mounted in the tail part of said anode-enhancer.

36. (New) A device as defined in claim 35, wherein said shield is a thin-wall body of revolution with the diameter not less than $5\mathbf{d}_{max}$ which is spaced from the nearest to the plasma cathode end of said anode-enhancer by the distance up to $20\mathbf{d}_{max}$, where $\mathbf{d}_{max}$ is a maximum cross-sectional dimension of the anode-enhancer.

37. (New) A device as defined in claim 36, wherein said thin-wall body of revolution has a flat or concave surface at the side of said anode-enhancer.

38. (New) An axisymmetric plasma cathode for the relativistic vacuum diode having a current-conductive rod for connection to a pulsed high-voltage power source and a dielectric end element, the perimeter of the rear end of said dielectric element embraces the perimeter of said rod with a continuous gap at least in the plane perpendicular to the axis of symmetry of the cathode.

39. (New) A cathode as defined in claim 38, wherein said current-conducting rod is pointed and said dielectric end element is provided with an opening for setting on said rod the setting part of which is located together with the pionted end inside the said opening.

40. (New) A cathode as defined in claim 39, wherein said dielectric end element has a blind opening.

41. (New) A cathode as defined in claim 39, wherein said dielectric end element has a through opening.

42. (New) A cathode as defined in claim 38, wherein said dielectric end element is made of a material selected from the group consisting of carbon-chain polymers with single carbon-to-carbon bonds, paper-base laminate or textolite type composite materials with organic binders, ebony wood, natural or synthetic mica, pure oxides of metals belonging to III-VII groups of the periodic table, inorganic glass, sitall, basalt-fiber felt and ceramic dielectrics.

43. (New) A cathode as defined in claim 38, wherein said dielectric end element has a developed surface.

44. (New) A cathode as defined in claim 39, wherein said dielectric end element has a developed surface.

45. (New) A cathode as defined in claim 40, wherein said dielectric end element has a developed surface.

46. (New) A cathode as defined in claim 38 wherein said minimum cross-sectional dimension of said dielectric element is $c_{de\ min} = (5\text{-}10)\ c_{cr\ max}$, and the length of said element is $l_{de} = (10\text{-}20)\ c_{cr\ max}$, where $c_{cr\ max}$ is a maximum cross-sectional dimension of the current-conducting rod.

47. (New) A cathode as defined in claim 39 wherein said minimum cross-sectional dimension of said dielectric element is $c_{de\ min} = (5\text{-}10)\ c_{cr\ max}$, and the length of said element is $l_{de} = (10\text{-}20)\ c_{cr\ max}$, where $c_{cr\ max}$ is a maximum cross-sectional dimension of the current-conducting rod.